STORMS AND WEATHER WARNINGS

WASHINGTON FORECAST DISTRICT

On the evening of the 4th, storm warnings were ordered from New London, Conn., to Eastport, Me., in connection with a disturbance of moderate intensity north of Lake Ontario. Strong winds occurred during the night and the warnings were lowered the following morning.

With a disturbance of slight intensity over northwestern Virginia on the morning of the 14th, storm warnings were ordered from Delaware Breakwater to Nantucket and small craft warnings south of Delaware Breakwater to Hatteras. Winds were fresh to strong from Atlantic City to Hatteras, but were only fresh north of Atlantic City.

On the morning of the 20th, when a disturbance of slight intensity was central 250 to 300 miles off the Virginia coast, storm warnings were hoisted between Boston and Block Island, and small craft warnings south of Block Island to Delaware Breakwater. On the evening of that date storm warnings were also ordered at Eastport, Me. Winds occurred substantially as indicated in the advices.

On the morning of the 23d, both in the State forecasts and radio bulletins, fresh to strong winds were forecast for the middle and north Atlantic coast and occurred as forecast. Severe squalls, at the time the wind shifted from southwest to northwest, were reported between Block Island and Sandy Hook.

Small craft warnings were advised on the 3d, 7th, 10th, 14th, 19th, and 20th for portions of the Atlantic coast from North Carolina northward.

On the 1st, warnings for heavy frost were issued for portions of New York, Pennsylvania, and the interior of New England, and occurred over northern New York and the interior of middle and northern New England.

On the 5th warnings for light frost were issued for portions of New York, Pennsylvania, western Massachusetts, and western Maryland, but temperatures were not quite low enough.—*R. H. Weightman.*

CHICAGO FORECAST DISTRICT

Storm warnings.—No general, severe disturbances affected the Great Lakes during the month and the number that developed enough energy to require warnings locally was small.

On the morning of the 4th storm warnings were ordered for Lake Huron and the lower lakes; verifying velocities were recorded at Port Huron and Erie.

On the night of the 9th storm warnings were ordered for Lakes Superior, Michigan and northern Huron and later these warnings were changed to small craft. Again on the night of the 21st small-craft warnings were displayed from Duluth to Munising on Superior and on northern Michigan and later extended to the lower lakes.

On the morning of the 24th storm warnings were issued for Lake Superior and northern Michigan; later in the day they were extended over southern Michigan and northern Huron and at night over southern Huron. On the morning of the 25th the small-craft warnings of the previous day were changed to storm warnings and all were lowered at night of that day.

Frost warnings.—Frost warnings were necessary from time to time during the first half of the month, but in all cases they were confined to the States of Minnesota, Michigan, and Wisconsin. In most cases the warnings specified light frost on low ground.—*C. A. Donnel.*

NEW ORLEANS FORECAST DISTRICT

Weather disturbances were generally of the summer type, with more than normal frequency of precipitation in the eastern and southern portions of the district, but were not attended by strong winds except where thunderstorms caused strong local winds for brief periods on a few days. No storm warnings were issued or required. Small craft warnings were displayed locally on the west coast of Texas on the 14th, 24th, and 29th.

Fair weather forecasts extending beyond the usual 36-hour period were issued on the 7th, 14th, and 21st and sent to addresses in Oklahoma for the benefit of alfalfa harvesters.—*R. A. Dyke.*

DENVER FORECAST DISTRICT

No warnings issued during the month.—*E. B. Gittings.*

SAN FRANCISCO FORECAST DISTRICT

The most remarkable feature pertaining to the meteorological work in this forecast district during June was the abnormal pressure situation over the northeast Pacific Ocean. The subpermanent high-pressure system, normally centered west of San Francisco and northeast of Hawaii, was at times displaced far to the west and south and at other times wholly absent, while for a large part of the month the trade-wind system was thoroughly disorganized. This condition attracted unusual attention because of the extraordinary interest which centered on weather and winds over the flying routes from this coast to Hawaii, coincident with the plans of several aviators to attempt the voyage during June, an interest which reached its climax with the flight of the Army plane from San Francisco to the islands on June 28–29, 1927. The great hazard in this flight, ranking second to the possibility of motor failure only, was involved in the possibility of not keeping the course to the objective, since a relatively slight deviation might mean disaster. Hence it was most essential to make proper allowance for probable drift, and the amount and direction of drift could only be gaged by an accurate foreknowledge of wind direction and velocity along the route. The unstable pressure conditions at sea were naturally the cause of some concern in view of the navigational uncertainties they implied.

Evidence of a change in this state of things was indicated on the weather charts of June 22 and notice was duly given that a resumption of normal conditions might be expected soon. Within three days thereafter a pressure reaction to normal had taken place and the trade winds were functioning as usual for the season.

For several days prior to the flight regular bulletins were issued describing conditions over the California-Hawaii flying routes and were given wide publicity by the various news-gathering agencies. The following, which was handed to Lieutenants Maitland and Hegenberger the evening before their departure, is a sample of the information the bulletins contained:

> Very stable atmospheric conditions prevail over the California-Hawaii airway and conditions are ideal for flight from this coast to the islands. From the islands to the one hundred and fortieth meridian winds will be moderate to fresh easterly during the next 36 hours and the weather partly cloudy with showers near the islands; from the one hundred and fortieth to the one hundred and thirtieth meridians, moderate north and northeast and partly cloudy; from the one hundred and thirtieth meridian to the coast fresh northerly and clear, winds increasing to strong north of Point Conception.

Reports from vessel weather stations and the testimony of the flyers themselves indicate that the conditions experienced were substantially as forecast.

No storm warnings were issued, and southerly gales on the Washington coast and Puget Sound on the 25th occurred without warning. They were associated with a disturbance in the Gulf of Alaska which appeared from data on the weather chart to be of only ordinary intensity, and which displayed no characteristics justifying the display of flags.

The fire hazard was subnormal for the most part, and most of the warnings which were issued related to the danger of fire arising from lightning storms. The hazard in northern California, however, increased markedly during the closing days of June, consonantly with the reconstruction of the oceanic high-pressure system and its ensuing invasion of the forecast district on the 27th. Effective warnings of this development were issued for the areas affected.—*T. R. Reed.*

RIVERS AND FLOODS

By R. E. SPENCER

In addition to the continuation of the Illinois River flood and the great flood in the Mississippi River and to scattered minor rises in the interior rivers of Ohio, Colorado, and California, important floods occurred in the Wabash system of Indiana, the streams of the St. Louis, Mo., district, the lower Arkansas and its tributaries, the Rio Grande, and the Columbia River System. Report on the floods of the Mississippi and the St. Louis district, including the Illinois, and that in the Columbia (which had not subsided at the close of the month) will be made later; the others having results of any consequence are discussed below:

Wabash system.—Heavy rain on May 18 and 19, when the streams were already comparatively full, resulted in a rise to flood stage over practically the entire Wabash River and in the main stream and West Fork of the White; and further showers thereafter continued the flood stages well into the first decade of June. Warnings were issued well in advance of the flood and were accurately verified, resulting in a saving in movable property estimated at $35,000. Unavoidable losses were as follows: Tangible property, $5,000; prospective crops, $191,600; suspension of business, $26,300. Owing to the lateness of the season, the delay in planting occasioned by this rise will doubtless result in a considerable reduction in some crops.

Topeka, Kans., district.—Of the floods in this district the official in charge of the Weather Bureau office at Topeka reports as follows:

> June, 1927, was marked by overflows in the basins of the Solomon, Saline, Smoky Hill, Osage (Marais des Cygnes), Cottonwood, and Neosho Rivers in Kansas. The chief damage was to growing crops, especially wheat and corn. Wheat was approaching maturity and the high water came too late to replant corn. Approximately 50,000 acres of crop land were flooded, much of it for several days. The estimated damage by river basins was as follows: Solomon Basin, $70,000; Smoky Hill Basin, including the Saline Basin, $20,000; Cottonwood Basin, $100,000; Neosho Basin, $350,000. The damage in the Osage Basin was small as the high water there lasted only a day or two.

The two overflows in the upper Solomon River at Beloit, Kans., caused comparatively little loss, but the later flood of this stream (from June 13 to 16) resulted in heavy crop damage. The official at Topeka reports further that the most important rise of the month was that which began in the Cottonwood, Neosho, and Osage Rivers after heavy rains on the night of June 18–19, whose effect was augmented by another heavy downfall on the night of 19–20. Warnings were in the main ample and very well verified.

Fort Smith and Little Rock, Ark., districts.—The effect of the floods in Kansas and of heavy local rains from June 17 to 24, was reflected in the lower Neosho River and the Arkansas River between Wyandotte, Okla., and Fort Smith, Ark., in the overflow of about 500 acres of land. Resultant damage amounted to about $10,000. But in the Verdigris Basin of Kansas—mainly Montgomery County—considerably greater damage occurred, 25,000 acres of land having been inundated, with the following resultant losses: Prospective crops, $150,000; mature crops, $50,000; real property, $2,500.

In the Lttle Rock, Ark., district no direct destruction by the floods is reported; but they of course prolonged the inundation of lands still under water from the great flood of the previous months, so that for the most part planting in the affected area will have to be abandoned for the 1927 season.

Rio Grande.—The official in charge of the Weather Bureau office at Brownsville, Tex., reports that—

> heavy to excessive rains from the 22d to about the 25th of June, extending from Starr County evidently across the Rio Grande into the watershed of the San Juan River of northern Mexico, caused a flood of considerable proportions during the last decade of June in the Rio Grande from Riogrande, Tex., to the mouth of the river.

Figures on the losses occasioned by this rise were very incomplete, but—

> according to reports, Willacy County, beyond the control levees, suffered the greatest acreage of inundation. Cameron County came next with considerable lands flooded, especially toward the coast and in the coast sections, while comparatively small acreages were flooded in Hidalgo and Starr Counties. Probably between one-third and one-half of the lands flooded were under cultivation and in crops, and the total monetary value of the various damages and losses from this flood, it is believed, will go well over $150,000.

Reports as to the value of Weather Bureau warnings were also very few, but those received indicate a saving of at least $50,000 in mature crops and livestock, and prove that the advices were of value as an aid to irrigation companies in preparing for the approaching flood.

This report is further interesting from the point of view of effective flood control by levees:

> Although, apparently, the volume of water passing Riogrande, Tex., during this flood was considerably greater than that of the average flood that comes to the Rio Grande Valley, and equal to some of the serious Rio Grande floods of the past, the flood control levees (in an advanced stage of construction now) in Hidalgo and Cameron Counties controlled the great volume of water and prevented a repetition of the widespread inundations of the past from a similar volume of water. In the main only lowlands in sections where the levees are yet unfinished, and of course lands between the control levees—a total of many thousand acres—were inundated.